

REMARKS

I. Status of Claims

Claims 15-16 and 18-28 are pending in the application. Claim 15 is the sole independent claim and currently amended without prejudice to and/or disclaimer of the subject matter therein. Claims 1-14 and 17 were previously canceled. New dependent claim 28 is added. Support for the amendments may be found, *inter alia*, in paragraphs [0023] and [0024] of the published Application. The Applicant believes that no new matter is added.

Claim 15 and 22 – 26 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over US 4,741,978 (hereinafter “Takabayashi”) in view of Takatoshi et al (EP 1 235 340) (hereinafter “Takatoshi”) in view of US 4,968,338 (hereinafter “Sugiyama”) in view of US Pat. Pub. 2001/0026429 (hereinafter “Fukuda”).

Claims 16, 18, 20-21 and 27 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Takabayashi in view of Takatoshi, Sugiyama, Fukuda and further in view of US Pat. Pub. 2002/0094467 (hereinafter “Nonobe”).

Claim 19 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Takabayashi in view of Takatoshi, Sugiyama, Fukuda and Nonobe, as applied to claims 15 and 18 above, and in further view of Ferguson et al. (USP 6,463,949) (hereinafter “Ferguson”).

Claim 19 also stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Takabayashi in view of Takatoshi, Sugiyama, Fukuda and Nonobe as applied to claims 15 and 18 above, and in further view of Sugawara et al. (USP 7,729,242 B2) (hereinafter “Sugawara”).

The Applicant respectfully requests reconsideration of these rejections in view of the foregoing amendments and the following remarks.

II. Rejections Under 35 U.S.C. § 103(a)

Independent claim 15, the only independent claim, stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Takabayashi in view of Takatoshi, Sugiyama and Fukuda.

The Applicant respectfully submits that claim 15 is patentable over the cited references at least because it recites, *inter alia*, “...the plurality of types of different abnormalities including ***abnormality in a power line supplying a power to an inverter of the motor and over-current in circuits after the current flows into the inverter***” and “an abnormality determining portion which ***counts up an inclusive number of the plurality of types of different abnormalities***” Emphasis added.

Certain embodiments of the present invention, for example, the invention of claim 15, utilize an abnormality detecting portion to detect a plurality of types of different abnormalities related to currents driving the motor and an abnormality determining portion to count the number of abnormalities regardless of type that have occurred in the supply system in a predetermined time period, then compare the number of abnormalities with a predetermined number, which is set. In at least one embodiment, the abnormality detecting portion may include an intelligent power module (IPM) sensor 60 provided in a power line that supplies power from a direct power supply 40 to an inverter 42. Further, the abnormality detecting portion may include two phase current sensors 62 and 64 that detects phase current I_u and I_v , and use the detected phase currents to determine whether there is an overcurrent abnormality. Based on the detected phase currents and power supply, a plurality of types of different abnormalities (e.g., overcurrent, lock, or short-circuit in the power supply) related to currents may be detected and counted in an inclusive number. *See* FIG. 1 and paragraph [0023] and [0024] of the published Application (US Pat. Pub. 2006/0153687). Utilizing this an abnormality detecting portion and abnormality determining portion, it is possible to determine whether the abnormality is in the motor or in the supply system. Thus, erroneous determinations can be minimized (*See* paragraph [0011] of the published application).

Takabayashi, Takatoshi and Sugiyama have been discussed before. The Office Action alleges that Takabayashi's reference numerals 24, 25 and 26 of FIG. 1 disclose an abnormality detecting portion that detects a plurality of types of different abnormalities related to driving the motor. However, the reference numerals 25 and 26 of Takabayashi only detect overcurrents in the motors 12 and 8 respectively, they detect a single type of abnormality (***overcurrent***) related to driving the motor but not “***abnormality in a power line supplying a power to an inverter of***

the motor” or “*over-current in circuits after the current flows into the inverter*” as required in the invention of claim 15. Further, Takabayashi’s detection section 24 only detects abnormal conditions such as “abnormal temperature rise in the fuel cell body 1, or an abnormal temperature rise in essential components of the fuel supply section 14.” Takabayashi does not teach or suggest the detection section 24 detects any abnormalities *related to driving the motor*. See, Takabayashi, col. 3, ll. 32-35.

The Takatoshi and Sugiyama references do not cure the deficiencies of Takabayashi. Takatoshi only mentions a sensorless motor. Sugiyama mentions detection of one type of abnormality – overcurrent. Thus, neither Takatoshi nor Sugiyama teaches or suggests detecting “*abnormality in a power line supplying a power to an inverter of the motor*” or “*over-current in circuits after the current flows into the inverter*” as required by claim 15.

Moreover, in the cited portion, col. 5, line 26 – col. 6, line 5, Sugiyama only counts one type of abnormality – overcurrent, and when the number of the overcurrent reaches N, the determination control section 12c determines the presence of an abnormality. In particular, Sugiyama only mentions detection of overcurrent of the current flows into the inverter. Sugiyama does not disclose detecting an overcurrent caused by the inverter itself and detecting an overcurrent at a motor, and is not possible to perform these detections.

Further, it would not have been obvious for a person skilled in the art to modify Sugiyama to perform these detections. Sugiyama only teaches detecting overcurrent by an over current detector 14 that is connected to an over current detection section 6b in the supply line of *rectified current* to the inverter. In contrast, the embodiments of the present invention not only detect an IPM error in the power line supplying power to the inverter but detect overcurrents at circuits after the current flows into the inverter and between the inverter and the motor. Therefore, Sugiyama does not teach or suggest detecting “*abnormality in a power line supplying a power to an inverter of the motor*” or “*over-current in circuits after the current flows into the inverter*” as required by claim 15.

Moreover, if the person skilled in the art had tried to modify Sugiyama to achieve the present invention, the modified Sugiyama would be detecting an overcurrent at an inverter of an air conditioner instead of the inverter of a fuel system. Or even arguendo, which is not so admitted, that the person skilled in the art would have a modified Sugiyama that detects an

overcurrent of the output of the fuel cell, the modified Sugiyama would only detect overcurrent of the current that flows into the inverter. Therefore, modifying Sugiyama to achieve an overcurrent detector that inclusively counts the detected overcurrents at an inverter itself, by a motor that has locked, or by IPM error is impossible for the person skilled in the art.

Fukuda determines one kind of abnormality by an over current limiting circuit 10 and another abnormality of motor lock by another over current protection circuit 20a [0053]. There is no description in either Sugiyama or Fukuda of counting up the inclusive number of errors detected at separate circuits, for example, over current limiting circuit 10 and over current protection circuit 20a. The separately detected errors in Fukuda are used for different determinations, and therefore, counting up those different types of errors inclusively together is unnatural for a person skilled in the art.

Further, because Fukuda determines the over current and motor lock by two individual circuits, the alleged combination of Fukuda and Sugiyama would result in a system that has one circuit for determining over-current that counts the number of the over current, and when the number of the over-current reaches a predetermined number, the circuit determines that there is an abnormality; and on the other hand, another circuit for determining motor lock that counts the number of motor lock, and when the number of the motor lock reaches another predetermined number, the circuit determines that there is an abnormality. Therefore, the combination of the prior arts will be a system different from the present invention, because the present invention counts up inclusive number of a plurality of types of different abnormalities, and when the counted up inclusive number of the abnormalities reaches a predetermined number larger than one, the system determines that there is an abnormality in the supply system. None of the prior art discloses a feature that counts up an inclusive number of different types of abnormalities.

Accordingly, Takabayashi, Takatoshi, Sugiyama and Fukuda, individually or in combination, do not teach or suggest *each and every limitation* of claim 15.

Nonobe, Ferguson and Sugawara are cited for features presented in dependent claims. Nonobe only mentions that if any abnormality arises in the fuel cell system, the pressure of the hydrogen gas supplied increases to an excessively high level. *See*, paragraph 72 of Nonobe. It is respectfully submitted that the portions (i.e., paragraphs 72-73 or 81) of Nonobe relied upon in the Office Action do not teach or even remotely suggest the abnormality determining portion

recited. Both Ferguson and Sugawara are cited for monitoring an outside air temperature of a system to control a valve. Even arguing Ferguson and Sugawara teach the feature as alleged by the Office Action, which is not so admitted, neither Ferguson nor Sugawara teaches or suggests current sensors as required by claim 15 and they do not cure the critical deficiencies of the above-identified references.

In addition, as discussed in MPEP 2143.01, obviousness can *only* be established by combining or modifying the *teachings of the prior art* to produce the claimed invention where there is some *teaching, suggestion, or motivation* to do so. *In re Kahn*, 441 F.3d 977, 986, 78 USPQ2d 1329, 1335 (Fed. Cir. 2006) (discussing rationale underlying the motivation-suggestion-teaching *test* as a guard against using hindsight in an obviousness analysis).

Also, as discussed in *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007), it remains necessary to identify the reason why a person of ordinary skill in the art would have been prompted to modify Takabayashi to incorporate other cited references in the manner as recited in the invention of claim 15. Obviousness cannot be sustained on mere conclusory statements.

Therefore, for at least these reasons, in our opinion, claim 15, as well as its dependent claims, are patentable over the cited references.

III. New Claim 28

New dependent claim 28 depends from claim 15 and should be allowable for at least the reasons discussed above for its base claim 15. Claim 28 defines further features of Applicants' invention, including:

- the over-current abnormality in the motor is detected by two phase current sensors attached to two of three phases of the inverter,
- the short-circuit current abnormality in an element in the motor is detected by a sensor provided in a power line supplying direct current power to the inverter, and
- the lock abnormality in the motor is detected based on a difference between an assumed speed of the motor and an estimated speed according to change in the two detected phase currents.

Support for these features may be found, *inter alia*, in paragraphs [0023] and [0024] of the published Application. The cited art contains no teaching or suggestion corresponding to any of these features. Allowance of this new claim is also respectfully requested.

IV. Conclusion

In light of the above discussion, the Applicant respectfully submits that the present application is in all aspects in allowable condition, and earnestly solicits favorable reconsideration and early issuance of a Notice of Allowance.

The Examiner is invited to contact the undersigned at (202) 220-4420 to discuss any matter concerning this application. The Office is authorized to charge any fees related to this communication to Deposit Account No. 11-0600.

Respectfully submitted,

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